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<120> mRNA Interferases and Methods of Use Thereof

<130> University of Medicine & Dentistry of New Jersey (601-1-131PCT)

<140> PCT/US2004/018571
<141> 2004-06-14

<150> 60/543,693
<151> 2004-02-11

<150> 60/478,515
<151> 2003-06-13

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aacaaaaacag gtatgtgtct gtgtgttccct tgtacaacgc aatcaaaagg atatccgttc 180
gaagttgttt tatccggta ggaacgtgat ggcgttagcgt tagctgatca ggtaaaaaagt 240
atcgccctggc gggcaagagg agcaacgaag aaaggaacag ttgccccaga ggaattacaa 300
ctcattaaag ccaaaattaa cgtactgatt ggtag 336

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Val Leu Ser Pro Phe Met Tyr Asn Asn Lys Thr Gly Met Cys Leu Cys
35 40 45
Val Pro Cys Thr Thr Gln Ser Lys Gly Tyr Pro Phe Glu Val Val Leu
50 55 60
Ser Gly Gln Glu Arg Asp Gly Val Ala Leu Ala Asp Gln Val Lys Ser
65 70 75 80
Ile Ala Trp Arg Ala Arg Gly Ala Thr Lys Lys Gly Thr Val Ala Pro
85 90 95
Glu Glu Leu Gln Leu Ile Lys Ala Lys Ile Asn Val Leu Ile Gly
100 105 110

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<400> 3
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gttgcgtgc ccttaaccag cggaggcaat tttgcggca ctgcccgtt tgcgggtcg 180
ttggatgggtt ttggcatacg taccacaggt gttgtacgtt gcgatcaacc ccggacaatt 240
gatatgaaag cacggggcgg aaaacgactc gaacgggttc cggagactat catgaacgaa 300
gttcttggcc gcctgtccac tattctgact tga 333

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His Glu Gln Gln Gly Thr Arg Pro Val Leu Ile Val Thr Pro Ala Ala
20 25 30
Phe Asn Arg Val Thr Arg Leu Pro Val Val Val Pro Val Thr Ser Gly
35 40 45
Gly Asn Phe Ala Arg Thr Ala Gly Phe Ala Val Ser Leu Asp Gly Val
50 55 60
Gly Ile Arg Thr Thr Gly Val Val Arg Cys Asp Gln Pro Arg Thr Ile
65 70 75 80
Asp Met Lys Ala Arg Gly Gly Lys Arg Leu Glu Arg Val Pro Glu Thr
85 90 95
Ile Met Asn Glu Val Leu Gly Arg Leu Ser Thr Ile Leu Thr
100 105 110

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<213> E. coli

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ttaatgcagg cgctcaatct gaatattgtat gatgaagtga agattgaccc ggtggatggc 120
aaattaatta ttgagccagt gcgtaaagag cccgtattta cgcttgcgtga actggtaac 180
gacatcacgc cggaaaacct ccacgagaat atcgactggg gagagccgaa agataaggaa 240
gtctggtaa 249

<210> 6
<211> 82
<212> PRT
<213> E. coli

<400> 6
Met Ile His Ser Ser Val Lys Arg Trp Gly Asn Ser Pro Ala Val Arg
1 5 10 15
Ile Pro Ala Thr Leu Met Gln Ala Leu Asn Leu Asn Ile Asp Asp Glu
20 25 30
Val Lys Ile Asp Leu Val Asp Gly Lys Leu Ile Ile Glu Pro Val Arg
35 40 45
Lys Glu Pro Val Phe Thr Leu Ala Glu Leu Val Asn Asp Ile Thr Pro
50 55 60
Glu Asn Leu His Glu Asn Ile Asp Trp Gly Glu Pro Lys Asp Lys Glu
65 70 75 80
Val Trp

<210> 7
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<212> DNA
<213> E. coli

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ctgctgaatg cgctgtctct gggcacagat aatgaagttt gcatggtcat tgataatggc 120
cggctgattt ttgagccgta cagacgcccc caatattcac tggctgagct actggcacag 180
tgtatccga atgctgaaat atcagctgaa gaacgagaat ggctggatgc accggcgact 240
ggtcaggagg aatctga 258

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<211> 85
<212> PRT
<213> E. coli

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20 25 30
Val Gly Met Val Ile Asp Asn Gly Arg Leu Ile Val Glu Pro Tyr Arg
35 40 45
Arg Pro Gln Tyr Ser Leu Ala Glu Leu Leu Ala Gln Cys Asp Pro Asn
50 55 60
Ala Glu Ile Ser Ala Glu Glu Arg Glu Trp Leu Asp Ala Pro Ala Thr
65 70 75 80
Gly Gln Glu Glu Ile
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<210> 9
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<212> PRT
<213> Artificial Sequence

<220>
<223> T54 to K77 fragment of E. coli MazE

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Thr Leu Ala Glu Leu Val Asn Asp Ile Thr Pro Glu Asn Leu His Glu
1 5 10 15
Asn Ile Asp Trp Gly Glu Pro Lys
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<210> 10
<211> 18
<212> PRT
<213> Artificial Sequence

<220>
<223> N60 to K77 fragment of E. coli MazE

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Pro Lys

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<210> 13		
<211> 50		
<212> DNA		
<213> Artificial Sequence		
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<223> single stranded oligonucleotide		
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<211> 23		
<212> DNA		
<213> Artificial Sequence		
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agatctcgat cccgcaaatt aat		23
<210> 15		
<211> 27		
<212> DNA		
<213> Artificial Sequence		
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<223> DNA primer		
<400> 15		
ttagagatca atttcctgcc gttttac		27
<210> 16		
<211> 22		
<212> DNA		
<213> Artificial Sequence		
<220>		
<223> DNA primer		
<400> 16		
ttaaagatcg tcaacgtaac cg		22

<210> 17
<211> 22
<212> DNA
<213> Artificial Sequence

<220>
<223> DNA primer

<400> 17
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<210> 18
<211> 24
<212> DNA
<213> Artificial Sequence

<220>
<223> DNA primer

<400> 18
gcccagttca ccgcaagat cgtc 24

<210> 19
<211> 27
<212> DNA
<213> Artificial Sequence

<220>
<223> DNA primer

<400> 19
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<210> 20
<211> 27
<212> DNA
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<220>
<223> DNA primer

<400> 20
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<210> 21
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<213> Artificial Sequence

<220>
<223> DNA primer

<400> 21
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<210> 22
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<212> DNA
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<223> DNA primer

<400> 22
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<210> 23
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<220>
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<220>
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<400> 24
cagttcagcg ccgaggaaac gcat 24

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<211> 24
<212> DNA
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<220>
<223> DNA primer

<400> 25
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<210> 26
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<220>
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<400> 26
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<210> 27
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<212> DNA
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<220>
<223> complementary DNA

<400> 27
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<211> 22
<212> DNA
<213> Artificial Sequence

<220>
<223> DNA primer

<400> 28
agaatgtgcg ccattttca ct 22

<210> 29		
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<212> DNA		
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<211> 18		
<212> DNA		
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<223> DNA fragment		
<400> 31		
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<210> 32		
<211> 12		
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<223> DNA fragment		
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<210> 33		
<211> 60		
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<213> Artificial Sequence		
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<212> DNA		
<213> Artificial Sequence		
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<223> DNA primer		
<400> 34		
caggagauac cucaaugauc a		21

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<210> 35
<211> 21
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<223> DNA primer

<400> 35
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<210> 36
<211> 21
<212> DNA
<213> Artificial Sequence

<220>
<223> DNA primer

<400> 36
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<210> 37
<211> 16
<212> DNA
<213> Artificial Sequence

<220>
<223> DNA primer

<400> 37
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<210> 38
<211> 23
<212> DNA
<213> Artificial Sequence

<220>
<223> DNA primer

<400> 38
tgtcctctat ggagttacta gtg 23

<210> 39
<211> 330
<212> DNA
<213> Bacillus halodurans

<400> 39
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ggttttgcgg tggttgcgtt aattaccaga caacaaaaag gttatcccttt tgaaatagaa 180
ataccacccgg ggttacctat tgaagggggtt attcttactg accaagtaaa aagtctggat 240
tggagagcaa gaaactttca cattaaagga caagcaccag agggaaactgt tactgattgt 300
ttacaactta ttcatcattttatcttaa 330

<210> 40
<211> 363
<212> DNA
<213> Staphylococcus epidermidis

<400> 40
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gggggagtaa gacctgttagt tatcattcaa aatgatactg gtaataaata tagtccaact 120
gtaattgttag ctgcgattac tgatggatt aataaagcga aaataccaac ccacgtagaa 180

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attaaaaaga aaaagtataa attagacaaa gattcagtta ttcttcttga acaaattaga 240
acactagata aaaagcgaaa aaaagaaaaa ttaacatttt ttcagagag taaaatgata 300
gagggttata atgccttaga tattagttt ggattaaata actttgatca tcataaatct 360
taa 363

<210> 41
<211> 411
<212> DNA
<213> *Staphylococcus aureus*

<400> 41
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gttattgttgcggcaataac tggtaggatt aataaagcga aaataccgac acatgttagag 180
attaaaaaga aaaagtataa gttggataaa gactcagtta tattattaga acaaattcgt 240
acacttgata aaaaacgatt gaaagaaaaa ctgacgtact tatccgatga taaaatgaaa 300
gaagtagata atgcactaat gattagttt gggctgaatg cagtagctca accagaaaaa 360
ttaggcgtcttattatgtat ttttcagag ataaataaaa tattgatata a 411

<210> 42
<211> 351
<212> DNA
<213> *Bacillus subtilis*

<400> 42
ttgattgtga aacgcggcga tgtttatattt gctgatttat ctcctgttgc tggctcagag 60
caaggcgggg tgcgcgggt ttttagtgcata caaaatgaca tcggaaatcg cttcagccca 120
actgctattt ttgcagccat aacagcacaa atacagaaaag cggaaattacc aacccacgtc 180
gaaatcgatg caaaacgcta cggtttgaa agagattccg ttatatttgc tggcaatt 240
cgacgattt acaagcaag gttAACGGat aagattactc atctggatga tggaaatgatg 300
gataagggtt atgaagcctt acaaatcagt ttggcactca ttgattttta g 351

<210> 43
<211> 324
<212> DNA
<213> *Neisseria meningitidis*

<400> 43
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gaaatcaaaa agacacgtcc ttgtgtcgta gtctcttcctc ctgaaataca caactatctc 120
aagactgtgc tgatcggtcc catgacgagc ggaagccgatc ctgcccgtt cccggtcaat 180
gtccgcgttcc aggataaaaga cggtttgctt ttgcccgaac agattaggc tggataaa 240
gcgggattgg tcaaacatct tggcaattt gacaacagta cggctgaaaaa actgtttgc 300
gtattgcagg agatgttgc ctga 324

<210> 44
<211> 366
<212> DNA
<213> *Morganella morgani*

<400> 44
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tcgcttgccttacccgcagg tcatgagcag caggaaacgc ggccggact gattgtcacg 120
ccggctgtttaacccgcgt gacccgcctg cctgttgc tggccgtgac cagcggaggt 180
aattttgcgc acacagcagg ctttgcgtgc tcgcgttgc ggcgcgcac acgtaccacc 240
ggcgttgc gttgcgtatca accccgagc atcgatgtaa agccgcgg cggcaaacga 300
ctcgaacggg tgccagagac tatcatggac gacgttcttgc gccgtctggc caccatcctg 360
acctga 366

<210> 45
<211> 321
<212> DNA
<213> *Mycobacterium tuberculosis*

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accgtggtc cgcacgtcgac aagcgccaa cctgcgggtt tccgaccaga gctggaagtc 180
atggaaacaa agacacggtt cctgggtggat cagatccgga cgatccgt cgtctatgtg 240
cacggcgatc cggtcgacta tctggaccgt gaccaaattgg ccaagggtgga acacgcccgtg 300
gcacgatacc ttggctgtg a 321

<210> 46
<211> 109
<212> PRT
<213> *Bacillus halodurans*

<400> 46
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20 25 30
Pro Lys Leu Phe Asn Lys Asn Thr Gly Phe Ala Val Val Cys Pro Ile
35 40 45
Thr Arg Gln Gln Lys Gly Tyr Pro Phe Glu Ile Glu Ile Pro Pro Gly
50 55 60
Leu Pro Ile Glu Gly Val Ile Leu Thr Asp Gln Val Lys Ser Leu Asp
65 70 75 80
Trp Arg Ala Arg Asn Phe His Ile Lys Gly Gln Ala Pro Glu Glu Thr
85 90 95
Val Thr Asp Cys Leu Gln Leu Ile His Thr Phe Leu Ser
100 105

<210> 47
<211> 120
<212> PRT
<213> *Staphylococcus epidermidis*

<400> 47
Met Ile Arg Arg Gly Asp Val Tyr Leu Ala Asp Leu Ser Pro Val Gln
1 5 10 15
Gly Ser Glu Gln Gly Gly Val Arg Pro Val Val Ile Ile Gln Asn Asp
20 25 30
Thr Gly Asn Lys Tyr Ser Pro Thr Val Ile Val Ala Ala Ile Thr Asp
35 40 45
Gly Ile Asn Lys Ala Lys Ile Pro Thr His Val Glu Ile Glu Lys Lys
50 55 60
Lys Tyr Lys Leu Asp Lys Asp Ser Val Ile Leu Glu Gln Ile Arg
65 70 75 80
Thr Leu Asp Lys Lys Arg Leu Lys Glu Lys Leu Thr Phe Leu Ser Glu
85 90 95
Ser Lys Met Ile Glu Val Asp Asn Ala Leu Asp Ile Ser Leu Gly Leu
100 105 110
Asn Asn Phe Asp His His Lys Ser
115 120

<210> 48
<211> 136
<212> PRT
<213> *Staphylococcus aureus*

<400> 48
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Gly Ser Glu Gln Gly Gly Val Arg Pro Val Val Ile Ile Gln Asn Asp
20 25 30
Thr Gly Asn Lys Tyr Ser Pro Thr Val Ile Val Ala Ala Ile Thr Gly
35 40 45
Arg Ile Asn Lys Ala Lys Ile Pro Thr His Val Glu Ile Glu Lys Lys
50 55 60

Lys Tyr Lys Leu Asp Lys Asp Ser Val Ile Leu Leu Glu Gln Ile Arg
65 70 75 80
Thr Leu Asp Lys Lys Arg Leu Lys Glu Lys Leu Thr Tyr Leu Ser Asp
85 90 95
Asp Lys Met Lys Glu Val Asp Asn Ala Leu Met Ile Ser Leu Gly Leu
100 105 110
Asn Ala Val Ala Gln Pro Glu Lys Leu Gly Val Tyr Tyr Met Tyr Phe
115 120 125
Ser Glu Ile Asn Lys Ile Leu Ile
130 135

<210> 49
<211> 116
<212> PRT
<213> *Bacillus subtilis*

<400> 49
Met Ile Val Lys Arg Gly Asp Val Tyr Phe Ala Asp Leu Ser Pro Val
1 5 10 15
Val Gly Ser Glu Gln Gly Gly Val Arg Pro Val Leu Val Ile Gln Asn
20 25 30
Asp Ile Gly Asn Arg Phe Ser Pro Thr Ala Ile Val Ala Ala Ile Thr
35 40 45
Ala Gln Ile Gln Lys Ala Lys Leu Pro Thr His Val Glu Ile Asp Ala
50 55 60
Lys Arg Tyr Gly Phe Glu Arg Asp Ser Val Ile Leu Leu Glu Gln Ile
65 70 75 80
Arg Thr Ile Asp Lys Gln Arg Leu Thr Asp Lys Ile Thr His Leu Asp
85 90 95
Asp Glu Met Met Asp Lys Val Asp Glu Ala Leu Gln Ile Ser Leu Ala
100 105 110
Leu Ile Asp Phe
115

<210> 50
<211> 115
<212> PRT
<213> *Neisseria meningitidis*

<400> 50
Met Tyr Ile Pro Asp Lys Gly Asp Ile Phe His Leu Asn Phe Asp Pro
1 5 10 15
Ser Ser Gly Lys Glu Ile Lys Gly Gly Arg Phe Ala Leu Ala Leu Ser
20 25 30
Pro Lys Ala Phe Asn Arg Ala Thr Gly Leu Val Phe Ala Cys Pro Ile
35 40 45
Ser Gln Gly Asn Ala Ala Ala Ala Arg Ser Ser Gly Met Ile Ser Thr
50 55 60
Leu Leu Gly Ala Gly Thr Glu Thr Gln Gly Asn Val His Cys His Gln
65 70 75 80
Leu Lys Ser Leu Asp Trp Gln Ile Arg Lys Ala Ser Phe Lys Glu Thr
85 90 95
Val Pro Asp Tyr Val Leu Asp Asp Val Leu Ala Arg Ile Gly Ala Val
100 105 110
Leu Phe Asp
115

<210> 51
<211> 121
<212> PRT
<213> Morganella morganii

<400> 51
Met Arg Arg Arg Leu Val Arg Arg Lys Ser Asp Met Glu Arg Gly Glu
1 5 10 15
Ile Trp Leu Val Ser Leu Asp Pro Thr Ala Gly His Glu Gln Gln Gly
20 25 30
Thr Arg Pro Val Leu Ile Val Thr Pro Ala Ala Phe Asn Arg Val Thr
35 40 45
Arg Leu Pro Val Val Val Pro Val Thr Ser Gly Gly Asn Phe Ala Arg
50 55 60
Thr Ala Gly Phe Ala Val Ser Leu Asp Gly Ala Gly Ile Arg Thr Thr
65 70 75 80
Gly Val Val Arg Cys Asp Gln Pro Arg Thr Ile Asp Met Lys Ala Arg
85 90 95
Gly Gly Lys Arg Leu Glu Arg Val Pro Glu Thr Ile Met Asp Asp Val
100 105 110
Leu Gly Arg Leu Ala Thr Ile Leu Thr
115 120

<210> 52
<211> 118
<212> PRT
<213> Mycobacterium tuberculosis

<400> 52
Met Met Arg Arg Gly Glu Ile Trp Gln Val Asp Leu Asp Pro Ala Arg
1 5 10 15
Gly Ser Glu Ala Asn Asn Gln Arg Pro Ala Val Val Val Ser Asn Asp
20 25 30
Arg Ala Asn Ala Thr Ala Thr Arg Leu Gly Arg Gly Val Ile Thr Val
35 40 45
Val Pro Val Thr Ser Asn Ile Ala Lys Val Tyr Pro Phe Gln Val Leu
50 55 60
Leu Ser Ala Thr Thr Gly Leu Gln Val Asp Cys Lys Ala Gln Ala
65 70 75 80
Glu Gln Ile Arg Ser Ile Ala Thr Glu Arg Leu Leu Arg Pro Ile Gly
85 90 95
Arg Val Ser Ala Ala Glu Leu Ala Gln Leu Asp Glu Ala Leu Lys Leu
100 105 110
His Leu Asp Leu Trp Ser
115

<210> 53
<211> 243
<212> DNA
<213> Deinococcus radiodurans

<400> 53
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gcccagcagg tgggactgac gcagagttca gaagtggagc tgcttcttca ggacggtcag 120
atgtcattcc ggccagttcc tgctcgccag tacgatctcg ccgcgcgtct gggcgaaatg 180
acacctgaaa atctgcatgg ggaaacagac tggggcgcac tggaaggacg cgaggaatgg 240
taa 243

<210> 54
<211> 246
<212> DNA
<213> *Bacillus halodurans*

<400> 54
gtgacactca tgactactat acaaaaagtgg ggaaatagtt tagctgttcg tattccgaac 60
cattatgcta aacatattaa cgttacgcaa ggatctgaaa ttgaactaag cttagggagt 120
gatcaaacgaa ttatttaaa gcctaaaaaa agaaagccaa cattagagga attagtggca 180
aaaatcactc ctgaaaacag acataacgaa attgatttcg ggagaacagg aaaggaatg 240
ttgtaa 246

<210> 55
<211> 258
<212> DNA
<213> *E. coli* Plasmid R100

<400> 55
atgcatacca cccgactgaa gagggttggc ggctcagtt tgctgaccgt cccaccggca 60
ctgctgaatg cgctgtctc gggcacagat aatgaagtt gcatgttcat tgataatggc 120
cggctgattt ttgagccgta cagacgcccga caatattcac tggctgagct actggcacag 180
tgtgatccga atgctgaaat atcagctgaa gaacgagaat ggctggatgc accggcgact 240
ggtcaggagg.aaatctga 258

<210> 56
<211> 294
<212> DNA
<213> *E. coli* Plasmid R466b

<400> 56
attttatatt taaatataac ttttatggag ggaaaaatgc ataccactcg actgaagaag 60
gttggcggct cagtcatgct gaccgtccca cggcactgc tgaatgcgt gtcgctgggt 120
acagataatg aagttggcat ggtcattgtat aatggccggc tgattgtgga gccgcacaga 180
cggccgcagt attcaactggc tgagctgttgc gcacagtgcg atccgaacgc taaaaatctcg 240
gcagaagaac gtgaatggct ggtatgcggc gcgctggtc aggagggaaat ctga 294

<210> 57
<211> 258
<212> DNA
<213> *Escherichia coli*

<400> 57
gtgcagatgc gtattaccat aaaaagatgg ggaaacagtgc caggtatggc cattccaaat 60
atcgtaatga aagaacttaa cttacagccg gggcagagcg ttgaagtgcg ggtgagcaac 120
aaccactga ttctgacacc catctccagg cgctactcgcc ttgatgaact gctggcacag 180
tggacatga acgcccggaa acttagcgag caggatgtct gggtaatac caccctcg 240
ggtgacgaaat tatggtaa 258

<210> 58
<211> 255
<212> DNA
<213> *Pseudomonas putida*

<400> 58
atgcagatca agattcaaca gtggggcaac agcgccgcga tccgcttgcc cgccgcagta 60
ctcaaggaga tgcgcctcggtgtcgctcc accctgagcc ttgacacaac gggtgagacg 120
atggtgctca aaccctcgat gtcgaaaccc aagtacaccc ttgaggaact gatggccca 180
tggacatga gtgcaccggaa gccagaggac atggccgact ggaatgccat gcgcccagtg 240
gggcgtgaag tgtga 255

<210> 59
<211> 260
<212> DNA
<213> Photobacterium profundum

<400> 59
gtgcaatgag aactcagata agaaagatcg gtaactcaact tggttcaatt attcctgcc 60
cttttattcg tcagcttcaa ctggcagagg gcgcagaaat tgatgttaaa acggttgtatg 120
aaaaaaattgt gattgagcca attagaaaaa tgaaaaaaacg tttcccattc agtgagcgtg 180
aattactaag tggattggat gcacacactg ctcatgctga cgaactggtt gtaatttcta 240
cccaggagct aggcgaataa 260

<210> 60
<211> 80
<212> PRT
<213> Deinococcus radiodurans

<400> 60
Met Thr Ser Gln Ile Gln Lys Trp Gly Asn Ser Leu Ala Leu Arg Ile 1
5 10 15
Pro Lys Ala Leu Ala Gln Gln Val Gly Leu Thr Gln Ser Ser Glu Val 20
25 30
Glu Leu Leu Leu Gln Asp Gly Gln Ile Val Ile Arg Pro Val Pro Ala 35
40 45
Arg Gln Tyr Asp Leu Ala Ala Leu Leu Ala Glu Met Thr Pro Glu Asn 50
55 60
Leu His Gly Glu Thr Asp Trp Gly Ala Leu Glu Gly Arg Glu Glu Trp 65
70 75 80

<210> 61
<211> 81
<212> PRT
<213> Bacillus halodurans

<400> 61
Met Thr Leu Met Thr Thr Ile Gln Lys Trp Gly Asn Ser Leu Ala Val 1
5 10 15
Arg Ile Pro Asn His Tyr Ala Lys His Ile Asn Val Thr Gln Gly Ser 20
25 30
Glu Ile Glu Leu Ser Leu Gly Ser Asp Gln Thr Ile Ile Leu Lys Pro 35
40 45
Lys Lys Arg Lys Pro Thr Leu Glu Glu Leu Val Ala Lys Ile Thr Pro 50
55 60
Glu Asn Arg His Asn Glu Ile Asp Phe Gly Arg Thr Gly Lys Glu Leu 65
70 75 80
Leu

<210> 62
<211> 85
<212> PRT
<213> E. coli PemI plasmid R100

<400> 62
Met His Thr Thr Arg Leu Lys Arg Val Gly Gly Ser Val Met Leu Thr 1
5 10 15
Val Pro Pro Ala Leu Leu Asn Ala Leu Ser Leu Gly Thr Asp Asn Glu 20
25 30
Val Gly Met Val Ile Asp Asn Gly Arg Leu Ile Val Glu Pro Tyr Arg 35
40 45
Arg Pro Gln Tyr Ser Leu Ala Glu Leu Leu Ala Gln Cys Asp Pro Asn 50
55 60
Ala Glu Ile Ser Ala Glu Glu Arg Glu Trp Leu Asp Ala Pro Ala Thr 65
70 75 80

Gly Gln Glu Glu Ile
85

<210> 63
<211> 97
<212> PRT
<213> E. coli PemI plasmid R466b

<400> 63
Met Leu Tyr Leu Asn Ile Thr Phe Met Glu Gly Lys Met His Thr Thr
1 5 10 15
Arg Leu Lys Lys Val Gly Gly Ser Val Met Leu Thr Val Pro Pro Ala
20 25 30
Leu Leu Asn Ala Leu Ser Leu Gly Thr Asp Asn Glu Val Gly Met Val
35 40 45
Ile Asp Asn Gly Arg Leu Ile Val Glu Pro His Arg Arg Pro Gln Tyr
50 55 60
Ser Leu Ala Glu Leu Leu Ala Gln Cys Asp Pro Asn Ala Glu Ile Ser
65 70 75 80
Ala Glu Glu Arg Glu Trp Leu Asp Ala Pro Ala Ala Gly Gln Glu Glu
85 90 95
Ile

<210> 64
<211> 85
<212> PRT
<213> Escherichia coli

<400> 64
Met Gln Met Arg Ile Thr Ile Lys Arg Trp Gly Asn Ser Ala Gly Met
1 5 10 15
Val Ile Pro Asn Ile Val Met Lys Glu Leu Asn Leu Gln Pro Gly Gln
20 25 30
Ser Val Glu Ala Gln Val Ser Asn Asn Gln Leu Ile Leu Thr Pro Ile
35 40 45
Ser Arg Arg Tyr Ser Leu Asp Glu Leu Leu Ala Gln Cys Asp Met Asn
50 55 60
Ala Ala Glu Leu Ser Glu Gln Asp Val Trp Gly Lys Ser Thr Pro Ala
65 70 75 80
Gly Asp Glu Ile Trp
85

<210> 65
<211> 84
<212> PRT
<213> Pseudomonas putida

<400> 65
Met Gln Ile Lys Ile Gln Gln Trp Gly Asn Ser Ala Ala Ile Arg Leu
1 5 10 15
Pro Ala Ala Val Leu Lys Gln Met Arg Leu Gly Val Gly Ser Thr Leu
20 25 30
Ser Leu Asp Thr Thr Gly Glu Thr Met Val Leu Lys Pro Val Arg Ser
35 40 45
Lys Pro Lys Tyr Thr Leu Glu Glu Leu Met Ala Gln Cys Asp Leu Ser
50 55 60
Ala Pro Glu Pro Glu Asp Met Ala Asp Trp Asn Ala Met Arg Pro Val
65 70 75 80
Gly Arg Glu Val

<210> 66
<211> 85
<212> PRT
<213> Photobacterium profundum

<400> 66
Ala Met Arg Thr Gln Ile Arg Lys Ile Gly Asn Ser Leu Gly Ser Ile
1 5 10 15
Ile Pro Ala Thr Phe Ile Arg Gln Leu Glu Leu Ala Glu Gly Ala Glu
20 25 30
Ile Asp Val Lys Thr Val Asp Gly Lys Ile Val Ile Glu Pro Ile Arg
35 40 45
Lys Met Lys Lys Arg Phe Pro Phe Ser Glu Arg Glu Leu Leu Ser Gly
50 55 60
Leu Asp Ala His Thr Ala His Ala Asp Glu Leu Val Val Ile Ser Thr
65 70 75 80
Gln Glu Leu Gly Glu
85

<210> 67
<211> 228
<212> DNA
<213> Homo sapiens

<400> 67
atgggtccag catctgttcc gactacctgt tgcttaacc tggcgaaccg caaaattccg 60
ctgcagcgcc tggaaagcta tcgcccattt acctctggca aatgcccgcga gaagcggtg 120
atctttaaaa ccaaactggc gaaagatatt tgcgcggatc cgaaaaaaaaa atgggtgcag 180
gattctatga aatatctgga tcagaaatct ccgaccggaa aaccgtaa 228

<210> 68
<211> 73
<212> PRT
<213> Homo sapiens

<400> 68
Gly Pro Ala Ser Pro Thr Thr Cys Cys Phe Asn Leu Ala Asn Arg Lys
1 5 10 15
Ile Pro Leu Gln Arg Leu Glu Ser Tyr Arg Arg Ile Thr Ser Gly Lys
20 25 30
Cys Pro Gln Lys Ala Val Ile Phe Lys Thr Lys Leu Ala Lys Asp Ile
35 40 45
Cys Ala Asp Pro Lys Lys Lys Trp Val Gln Asp Ser Met Lys Tyr Leu
50 55 60
Asp Gln Lys Ser Pro Thr Pro Lys Pro
65 70

<210> 69
<211> 357
<212> DNA
<213> Mycobacterium tuberculosis

<400> 69
gtatgcgcc gcggtgagat ttggcagggtc gatctcgacc ccgctcgagg tagcgaagcg 60
aacaaccgcgccccgt cgctcgatc aacgaccggg ccaacgcgcac cgccacgcgt 120
cttggcgccg gcgtcatcac cgctcgccg gtgacgagca acatcgccaa ggtctatccg 180
tttcagggtgt tttgtcggtc caccactact ggtctccagg tcgactgcaa ggcgcaggcc 240
gagcaaatca gatcgattgc taccgagccg ttgctccggc caatcgcccg agtttcagcc 300
gccaacttg cccagctcga tgaggcttg aaactgcata tcgacttatg gtcgttag 357

<210> 70
 <211> 282
 <212> DNA
 <213> *Mycobacterium tuberculosis*

<400> 70
 atgctgcgcg gtgagatctg gcaggtcgac ctggatccgg cccgcggcag cgccggaaat 60
 atgcggccgc cagcgtaat tgtcagcaac gacagggcca acgctgccgc gatacgtctc 120
 gaccgaggcg tggtgccggt tgtcccggtt accagcaaca ccgaaaaggt ccccattcca 180
 ggtgttggttc cccgcagcga gcgggtggct ggccgtcgat tcgaaggcgc aggcccagca 240
 ggttggatcc gtcgctgcgc aacgtctccc ctgcccagct ga 282

<210> 71
 <211> 345
 <212> DNA
 <213> *Mycobacterium tuberculosis*

<400> 71
 gtgggtgatta gtcgtgccga gatctactgg gctgacctcg ggccgcacatc aggcaagtca 60
 cccgcgaagc gcccgggt gctcgtaatc cagtcagatc cgtacaacgc aagtgcgcct 120
 gccactgtga tcgcagcggt gatcacgtcc aatacggcgc tggcggaat gcccggcaac 180
 gtgttcttgc cccgcgaccac aacgcgactg ccacgtgact cggtcgtcaa cgtcacggcg 240
 atgtcacgc tcaacaagac tgacctcacc gaccgagttg gggaggtgcc agcgagctt 300
 atgcacgagg ttgaccgagg acttcgtcgc gtactggacc tttga 345

<210> 72
 <211> 309
 <212> DNA
 <213> *Mycobacterium tuberculosis*

<400> 72
 atgcggcgcg gtgaattgtg gtttgcgc acacctggtg gtgacagacc agtacttgc 60
 cttaccagag atccgtggc agaccgcatac ggcgcgtcg ttgtgggtgc cctaaccgc 120
 acccgccgag gcctgggtc ggaattggag ctcacggccg tcgaaaacccg tttccgagc 180
 gactgcgtcg tcaacttcga caacattcat acgttgcac gcaccgcatt ccgacgcccgc 240
 atcaccggc tggccggc cccgcctgcac gaaggctgtc aaacactccg ggcgagcact 300
 ggggtgtga 309

<210> 73
 <211> 330
 <212> DNA
 <213> *Mycobacterium tuberculosis*

<400> 73
 gtgaccgcac ttccggcgcg cggagaggtg tgggtgtg agatggctga gatcggtcgg 60
 cgaccagtcg tcgtgtgtc gcgcgtgcc ggcgcgtcc ggctgcgacg cgcacttgc 120
 gcgcctgca ccacgaccat ccgagggtca ggcgtgagg ttgttctga acccggttcc 180
 gacccgatcc cgccgcgttc cgcggtaat ttggactcag tcgaaagtgt ctcggtcgc 240
 gtattggta atccgttgg cccgcctgcac gacatccga tgccgcctat ctgcacggcc 300
 ctcgaggctcg ccgtcgattt ctctcgatga 330

<210> 74
 <211> 118
 <212> PRT
 <213> *Mycobacterium tuberculosis*

<400> 74
 Met Met Arg Arg Gly Glu Ile Trp Gln Val Asp Leu Asp Pro Ala Arg
 1 5 10 15
 Gly Ser Glu Ala Asn Asn Gln Arg Pro Ala Val Val Val Ser Asn Asp
 20 25 30
 Arg Ala Asn Ala Thr Ala Thr Arg Leu Gly Arg Gly Val Ile Thr Val
 35 40 45
 Val Pro Val Thr Ser Asn Ile Ala Lys Val Tyr Pro Phe Gln Val Leu
 50 55 60

Leu Ser Ala Thr Thr Gly Leu Gln Val Asp Cys Lys Ala Gln Ala
65 70 75 80
Glu Gln Ile Arg Ser Ile Ala Thr Glu Arg Leu Leu Arg Pro Ile Gly
85 90 95
Arg Val Ser Ala Ala Glu Leu Ala Gln Leu Asp Glu Ala Leu Lys Leu
100 105 110
His Leu Asp Leu Trp Ser
115

<210> 75
<211> 93
<212> PRT
<213> *Mycobacterium tuberculosis*

<400> 75
Met Leu Arg Gly Glu Ile Trp Gln Val Asp Leu Asp Pro Ala Arg Gly
1 5 10 15
Ser Ala Ala Asn Met Arg Arg Pro Ala Val Ile Val Ser Asn Asp Arg
20 25 30
Ala Asn Ala Ala Ile Arg Leu Asp Arg Gly Val Val Pro Val Val
35 40 45
Pro Val Thr Ser Asn Thr Glu Lys Val Pro Ile Pro Gly Val Val Ala
50 55 60
Gly Ser Glu Arg Trp Pro Gly Arg Arg Phe Glu Gly Ala Gly Pro Ala
65 70 75 80
Gly Trp Ile Arg Arg Cys Ala Thr Ser Pro Leu Pro Ser
85 90

<210> 76
<211> 114
<212> PRT
<213> *Mycobacterium tuberculosis*

<400> 76
Met Val Ile Ser Arg Ala Glu Ile Tyr Trp Ala Asp Leu Gly Pro Pro
1 5 10 15
Ser Gly Ser Gln Pro Ala Lys Arg Arg Pro Val Leu Val Ile Gln Ser
20 25 30
Asp Pro Tyr Asn Ala Ser Arg Leu Ala Thr Val Ile Ala Ala Val Ile
35 40 45
Thr Ser Asn Thr Ala Leu Ala Ala Met Pro Gly Asn Val Phe Leu Pro
50 55 60
Ala Thr Thr Thr Arg Leu Pro Arg Asp Ser Val Val Asn Val Thr Ala
65 70 75 80
Ile Val Thr Leu Asn Lys Thr Asp Leu Thr Asp Arg Val Gly Glu Val
85 90 95
Pro Ala Ser Leu Met His Glu Val Asp Arg Gly Leu Arg Arg Val Leu
100 105 110
Asp Leu

<210> 77
<211> 102
<212> PRT
<213> *Mycobacterium tuberculosis*

<400> 77
Met Arg Arg Gly Glu Leu Trp Phe Ala Ala Thr Pro Gly Gly Asp Arg
1 5 10 15
Pro Val Leu Val Leu Thr Arg Asp Pro Val Ala Asp Arg Ile Gly Ala
20 25 30
Val Val Val Ala Leu Thr Arg Thr Arg Arg Gly Leu Val Ser Glu
35 40 45

Leu Glu Leu Thr Ala Val Glu Asn Arg Val Pro Ser Asp Cys Val Val
50 55 60
Asn Phe Asp Asn Ile His Thr Leu Pro Arg Thr Ala Phe Arg Arg Arg
65 70 75 80
Ile Thr Arg Leu Ser Pro Ala Arg Leu His Glu Ala Cys Gln Thr Leu
85 90 95
Arg Ala Ser Thr Gly Cys
100

<210> 78
<211> 109
<212> PRT
<213> *Mycobacterium tuberculosis*

<400> 78
Met Thr Ala Leu Pro Ala Arg Gly Glu Val Trp Trp Cys Glu Met Ala
1 5 10 15
Glu Ile Gly Arg Arg Pro Val Val Val Leu Ser Arg Asp Ala Ala Ile
20 25 30
Pro Arg Leu Arg Arg Ala Leu Val Ala Pro Cys Thr Thr Ile Arg
35 40 45
Gly Leu Ala Ser Glu Val Val Leu Glu Pro Gly Ser Asp Pro Ile Pro
50 55 60
Arg Arg Ser Ala Val Asn Leu Asp Ser Val Glu Ser Val Ser Val Ala
65 70 75 80
Val Leu Val Asn Arg Leu Gly Arg Leu Ala Asp Ile Arg Met Arg Ala
85 90 95
Ile Cys Thr Ala Leu Glu Val Ala Val Asp Cys Ser Arg
100 105

<210> 79
<211> 351
<212> DNA
<213> *Bacillus anthracis*

<400> 79
ttgattgtaa aacgcggcga cgtgtatTTT gcagacCTTT ccccAGTTGT tggTTCTGAG 60
caaggaggTG ttcgtccggT tcttGTCATT caaaATGACA tcggAAATCG ttttagTCCTA 120
acggTgATG tagcggCTAT tactgcacAG attcaAAAG cgaaATTACc cactcatgtG 180
gaaattGATG cgaaaaAGTA cggTTTgAG agagattCTG ttatTTTact tgAGCAGATT 240
cgaacaATCG ataagcAGCG cttAACGGAC aaaatCACTC acttagatGA agtGATGATG 300
attcgtgtAG atgaAGCGCT acaaATTAGT ttaggactAA tagattttA a 351

<210> 80
<211> 116
<212> PRT
<213> *Bacillus anthracis*

<400> 80
Met Ile Val Lys Arg Gly Asp Val Tyr Phe Ala Asp Leu Ser Pro Val
1 5 10 15
Val Gly Ser Glu Gln Gly Gly Val Arg Pro Val Leu Val Ile Gln Asn
20 25 30
Asp Ile Gly Asn Arg Phe Ser Pro Thr Val Ile Val Ala Ala Ile Thr
35 40 45
Ala Gln Ile Gln Lys Ala Lys Leu Pro Thr His Val Glu Ile Asp Ala
50 55 60
Lys Lys Tyr Gly Phe Glu Arg Asp Ser Val Ile Leu Leu Glu Gln Ile
65 70 75 80
Arg Thr Ile Asp Lys Gln Arg Leu Thr Asp Lys Ile Thr His Leu Asp
85 90 95
Glu Val Met Met Ile Arg Val Asp Glu Ala Leu Gln Ile Ser Leu Gly
100 105 110

Leu Ile Asp Phe
115

<210> 81
<211> 348
<212> DNA
<213> Pseudomonas putida

<400> 81
gtgaaacggt tgaaattcgc caggggtgat attttcgcg tcaacctgga cccaacagtc 60
ggcgccggaaac agcaggggctc cggccgaccc gcactggtac ttactccggc tgcgttcaat 120
gcttcaggcc tggctgtaat catcccgatc actcaaggtg gggatttcgc gaggcatgcg 180
ggtttcgctg tcacgctcag cgggtgcggc acggcagactc aggggggtgat gctttgcaac 240
caggtgcgca cagtcgaccc tgaagcacga tttgccaagg gcatagagtc ggtgcctgaa 300
gctgtcatcc tggatgcact ggcgcgtgtg caaaccctat tcgattaa 348

<210> 82
<211> 345
<212> DNA
<213> Mycobacterium celatum

<400> 82
tgaattgctc tgacggaacg cggcgacatc tacatcgttt cgcttgaccc gacgtcggga 60
catgagcaga gcggcacgca cccagtttg gtcgtgtccc cgggcgcgtt taatcgccctg 120
acgaaaacac cggtcgtgct acctataaca cgcggcggga actttgccc aacggcaggg 180
ttcgctgtct cgctgaccga tgcgggtact cgccaccgcg gcgtaatacg ctgcgatcag 240
cctcgctcga ttgatatccg cggccgtaaa ggcgcgaagg ttgaacgtgt gccgtctggg 300
gttcttgacg aagcgttggc caagctcgcc acgatcttga cttga 345

<210> 83
<211> 366
<212> DNA
<213> Shigella flexneri 2a str. 301

<400> 83
atggtaaagg cacggacgcc acatcggtt gagatctggt attttaaccc tgatccgggt 60
gccgggcattg aacttcaggg gccacattat tgcatgtgg taacggacaa aaaaactcaac 120
aatgttttaa aagttgtat gtgctgcgg atttcaacag gggcaaatgc agcacgttcc 180
acaggggtga cggtaacgt cctcccccgt gatacgc当地 ccggtaacct gcatggcgtt 240
gtactttgtc accagctaaa agccgtcgat cttattgccc gtggcgctaa atttcataacc 300
gttgcgatg aaaaattgtat tagtgaagtt atcagtaaac tggtaattt aatcgaccca 360
caataa 366

<210> 84
<211> 351
<212> DNA
<213> E. coli

<400> 84
atggtaaaga aaagtgaatt tgaacggggc gacattgtgc tggttggcct tgatccagca 60
agcggccatg aacagcaagg tgctggcga cctgcgttgc tgctctccgt tcaagccttt 120
aatcaactgg gaatgacgct ggtggccccc attacgcagg gcgaaattt tggccgttat 180
gccggattta gcgttcctt acattgcgaa gaaggcgatg tgcacggcgt ggtgctgggt 240
aatcaggtgc ggatgatgga tctacacgcc cggctggcaa agcgtattgg tctggctgca 300
gatgaggtgg tggaaagaggc gttattacgc ttgcaggcgg tggtaataa a 351

<210> 85
<211> 115
<212> PRT
<213> Pseudomonas putida

<400> 85
Met Lys Arg Leu Lys Phe Ala Arg Gly Asp Ile Val Arg Val Asn Leu
1 5 10 15

Asp Pro Thr Val Gly Arg Glu Gln Gln Gly Ser Gly Arg Pro Ala Leu
20 25 30
Val Leu Thr Pro Ala Ala Phe Asn Ala Ser Gly Leu Ala Val Ile Ile
35 40 45
Pro Ile Thr Gln Gly Gly Asp Phe Ala Arg His Ala Gly Phe Ala Val
50 55 60
Thr Leu Ser Gly Ala Gly Thr Gln Thr Gln Gly Val Met Leu Cys Asn
65 70 75 80
Gln Val Arg Thr Val Asp Leu Glu Ala Arg Phe Ala Lys Arg Ile Glu
85 90 95
Ser Val Pro Glu Ala Val Ile Leu Asp Ala Leu Ala Arg Val Gln Thr
100 105 110
Leu Phe Asp
115

<210> 86
<211> 111
<212> PRT
<213> *Mycobacterium celatum*

<400> 86
Met Thr Glu Arg Gly Asp Ile Tyr Ile Val Ser Leu Asp Pro Thr Ser
1 5 10 15
Gly His Glu Gln Ser Gly Thr Arg Pro Val Leu Val Val Ser Pro Gly
20 25 30
Ala Phe Asn Arg Leu Thr Lys Thr Pro Val Val Leu Pro Ile Thr Arg
35 40 45
Gly Gly Asn Phe Ala Arg Thr Ala Gly Phe Ala Val Ser Leu Thr Asp
50 55 60
Ala Gly Thr Arg Thr Ala Gly Val Ile Arg Cys Asp Gln Pro Arg Ser
65 70 75 80
Ile Asp Ile Arg Ala Arg Lys Gly Arg Lys Val Glu Arg Val Pro Ser
85 90 95
Gly Val Leu Asp Glu Ala Leu Ala Lys Leu Ala Thr Ile Leu Thr
100 105 110

<210> 87
<211> 121
<212> PRT
<213> *Shigella flexneri* 2a str. 301

<400> 87
Met Val Lys Ala Arg Thr Pro His Arg Gly Glu Ile Trp Tyr Phe Asn
1 5 10 15
Pro Asp Pro Val Ala Gly His Glu Leu Gln Gly Pro His Tyr Cys Ile
20 25 30
Val Val Thr Asp Lys Lys Leu Asn Asn Val Leu Lys Val Ala Met Cys
35 40 45
Cys Pro Ile Ser Thr Gly Ala Asn Ala Ala Arg Ser Thr Gly Val Thr
50 55 60
Val Asn Val Leu Pro Arg Asp Thr Gln Thr Gly Asn Leu His Gly Val
65 70 75 80
Val Leu Cys His Gln Leu Lys Ala Val Asp Leu Ile Ala Arg Gly Ala
85 90 95
Lys Phe His Thr Val Ala Asp Glu Lys Leu Ile Ser Glu Val Ile Ser
100 105 110
Lys Leu Val Asn Leu Ile Asp Pro Gln
115 120

<210> 88
<211> 116
<212> PRT
<213> E. coli

<400> 88
Met Val Lys Lys Ser Glu Phe Glu Arg Gly Asp Ile Val Leu Val Gly
1 5 10 15
Phe Asp Pro Ala Ser Gly His Glu Gln Gln Gly Ala Gly Arg Pro Ala
20 25 30
Leu Val Leu Ser Val Gln Ala Phe Asn Gln Leu Gly Met Thr Leu Val
35 40 45
Ala Pro Ile Thr Gln Gly Gly Asn Phe Ala Arg Tyr Ala Gly Phe Ser
50 55 60
Val Pro Leu His Cys Glu Glu Gly Asp Val His Gly Val Val Leu Val
65 70 75 80
Asn Gln Val Arg Met Met Asp Leu His Ala Arg Leu Ala Lys Arg Ile
85 90 95
Gly Leu Ala Ala Asp Glu Val Val Glu Glu Ala Leu Leu Arg Leu Gln
100 105 110
Ala Val Val Glu
115

<210> 89
<211> 17
<212> RNA
<213> Artificial Sequence

<220>
<223> mRNA transcript

<400> 89
aatgatgaca ctggaag

17

<210> 90
<211> 17
<212> RNA
<213> Artificial Sequence

<220>
<223> mRNA transcript

<400> 90
gtcgatggaca ttgatgg

17

<210> 91
<211> 17
<212> RNA
<213> Artificial Sequence

<220>
<223> mRNA transcript

<400> 91
atctcgaaaca cgcagcc

17

<210> 92
<211> 17
<212> RNA
<213> Artificial Sequence

<220>
<223> mRNA transcript

<400> 92
tcgtttaca cccttga

17